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**Laughlin**

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(54) **N X M MONOLITHIC SWITCH FOR AN OPTICAL NETWORK AND METHOD OF OPERATION THEREOF**

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See application file for complete search history.

(57) **ABSTRACT**

An N×M monolithic switch and a method of operating the switch. In one embodiment, the switch includes: (1) a monolithic refractive element, (2) N input/output ports coupled to the monolithic refractive element and configured to inject electromagnetic energy into a first set of planes in the monolithic refractive element at an angle that causes total internal reflection of the electromagnetic energy between first and second refractive surfaces of the monolithic refractive element, N being greater than one, (3) M input/output ports coupled to the monolithic refractive element and configured to extract electromagnetic energy travelling in a second set of planes in the monolithic refractive element, M being greater than one, the second set of planes being aparallel to the first set of planes and (4) a plurality of frustrating elements coupled to the monolithic refractive element and corresponding to the N input/output ports and the M input/output ports and configured to frustrate the total internal reflection selectively to cause the electromagnetic energy to travel from ones of the first set of planes to ones of the second set of planes.

**20 Claims, 6 Drawing Sheets**

